

Boundary County, Idaho

Wildland/Urban Interface

Fire Mitigation Plan

August, 2003

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INDEX

INTRODUCTION

- 2 THE ASSESSMENT PHASE (Phase 1)
 - Brief Fire History
- 3 FIELD ASSESSMENT
- 5 MITIGATION WORK DEFINITIONS
- 6 RESULTS OF FILED ASSESSMENT
 - Rural Situations
- 7 City of Bonners Ferry Situation
- 8 PUBLIC INVOLVEMENT AND EDUCATION
- 11 MITIGATION PLAN (Phase 2)
 - PRIORITIES FOR FUEL TREATMENT WORK
- 13 PLAN IMPLEMENTATION
 - Funding the Plan
 - Mitigation Work
- 16 ON-GOING WORK TOWARD PLAN IMPLEMENTATION
- 17 RELATED ISSUES, OUTSIDE THIS IFM CONTRACT

APPENDIX

- 19 CONTRACT ADDENDUM
- 20 DEFENSIBLE SPACE PLAN
- 21 HOME ASSESSMENT
 - Map 1, Boundary County Field Assessment
 - Map 2, City of Bonners Ferry Field Assessment
 - Map 3, City of Moyie Springs Field Assessment

**BOUNDARY COUNTY IDAHO
WILDLAND/URBAN INTERFACE
FIRE MITIGATION PLAN
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INTRODUCTION

In March, 2003, the County Commissioners of Boundary County Idaho advertised a Request for Proposals (RFP) for a Project Manager, Wildland Urban Interface Fire Mitigation Program. The RFP required that an assessment of the Wildland Urban Interface fire risk in Boundary County be completed (Phase 1). From the assessment, a plan for mitigation of the fire risk was to be prepared (Phase 2). In the plan, priorities for mitigation work, treating forest fuels, were to be established. Necessary maps and other supporting materials were to be included in the plan. Upon completion of the mitigation plan, the Project Manager would then be responsible for implementing the plan through grants and other methods in order to reduce the risks of catastrophic wildland fire to homes in Boundary County (Phase 3).

Inland Forest Management (IFM) was the successful bidder on the RFP. IFM formed a 3 person team to accomplish the required work under the RFP. Ken Nielson was designated as Project Manager (PM), providing general oversight of the RFP, seeking of grants, coordination with various agencies and setting up actual work on the ground to provide mitigation of fire risk to various properties in the county. Chuck Roady was to provide contact and coordination between the team, various volunteer fire departments in the county and the public at large. Bob Bosworth was designated as principal author of the mitigation plan and was to do the majority of field assessment for the plan.

Upon notification of the successful bid on the RFP, the IFM team immediately began developing a method to accomplish the assessment, based on known fire behavior influences. A strategy for public education and involvement was formed. In addition the team began seeking all available opportunities to apply for grants for mitigation work.

The IFM team started the assessment phase with a simultaneous public education and awareness program. Fire departments and the general public were made aware that the plan was being prepared. It was hoped that the public would develop interest in the plan and concern for fire safety early, so that as soon as the mitigation plan was complete, actual work in reducing risk of fires around homes in the county could begin.

The following report documents the actions taken by the team. It describes the methodologies used for the assessment. It documents the efforts that were made to provide for public education and information needs. It establishes priorities for fuel treatment activities in Boundary County to provide mitigation for existing risks of wildland fire in the urban interface. It explains the rationale for these priorities. A plan is laid out to direct activities into priority areas for fuel treatment so that maximum effectiveness can be attained with grant monies that may be available for this type of work.

THE ASSESSMENT PHASE (Phase 1)

BRIEF FIRE HISTORY, Boundary County

Large forest fires have played a prominent role in the forests of Boundary County for a period dating from the end of the last glacial period. Most forest types in the county show a history of large, stand replacement fires that often leave burn patterns of several thousand acres on the landscape. Large fires have been caused both by lightning and humans.

The large fires were documented in the 1900-2000 period, many of which occurred in present day wildland/urban interface. In 1910, a large fire burned along the Katka face and into Montana. The Hellroaring fire burned from Round Prairie to the top of Queen Mountain in 1926. In 1931, the Deer Creek fire started in lower Deer Creek and burned north and east into the Yahk River drainage in Canada.

The Brush Lake fire in 1945 was probably set by children at play. It burned from west of US 95 east into the area burned by the Hellroaring fire.

1967 was dominated by two large fires in the Selkirk mountains, Sundance and Trapper Peak. These fires burned outside the urban areas, but during its historic run, the Sundance fire was pelting the Kootenai River valley with firebrands. It is perhaps only by good luck that this fire did not cause a disastrous wildland/urban interface fire somewhere in the Kootenai Valley.

In 1979 two large human caused fires occurred. A fire started by a chainsaw burned about 1000 acres above the Camp 9 road, barely missing two rural residences. At about the same time, an electric fence started the Brown's Creek fire, burning several thousand acres and making a run through a developing rural community. Several homes burned, and many others barely escaped destruction.

In 1985, the Swimming Pool fire, caused by humans, made a run along the ridge just above homes on the east side of Bonners Ferry. This fire spotted across the Kootenai River. Fortunately, the firebrand did not land in cured crops nearby, or a major fire racing out of the valley and onto the North Bench, toward the city of Moyie Springs, would have developed. Quick action by firemen and agencies kept the fire away from the many homes along and below the ridge above Bonners Ferry.

This brief summary of some of the larger recent fires in the county shows why fire managers have had a long-standing concern for the protection of life and property within the entire county. Fire history, existing fuel types, and the expansion of dwellings further into the wildland setting, all suggest that there is a need to assess and address the potential for future disastrous fires.

FIELD ASSESSMENT

The IFM team determined that the assessment needed to be efficient, sample known factors important to fire behavior or risk to buildings, and cover the broad range of conditions that exist in the wildland/urban interface of Boundary County. A method was needed that would evaluate similar field conditions in various parts of the county and assign similar fire risks.

The process selected involved driving all public roads in the county. At any point where human habitation was visible from the road, a Risk Assessment Form (Example 1.) was filled out documenting conditions around the building(s). At each viewpoint, the road number and milepost was recorded, and a note was made at the approximate location on a county road map.

In addition, the perimeters of the City of Bonners Ferry were assessed using the same Risk Assessment Form. Risk conditions were mapped for the parts of the city exposed to native forest vegetation. In the city environment, the evaluation was done on an area basis, rather on an individual building basis.

The team felt that assessing the visible homes would be an adequate sample to describe overall risks in the county. The team also recognized that time constraints did not allow for seeking permission to go on private lands or private drives to assess homes not visible from public roads. The teams personal knowledge of some non-visible homes indicated that these properties would rate out similarly to those that were visible, some being at high risk, others at moderate or low risk. A complete sample of all homes in the county is not necessary to set priorities for mitigation activities.

The Risk Assessment Form is a matrix that includes six factors that evaluate fire risk. These factors could be easily estimated from some distance from a property so that the overall risk of the buildings could be determined. The factors included:

1. **ASPECT.** Aspect affects fire behavior because of its influence on fuels. Some aspects are warmer than others, and are typically warmer and dryer for longer periods in a given day or season. Some aspects are directly exposed to the drying effects of sunshine, or prevailing winds, while others are only indirectly exposed to sunlight or prevailing winds. These differences affect expected fire behavior.
2. **SLOPE.** Slope is a factor because it generally increases the effects of wind on fire behavior. Fire generally moves uphill, and the steeper the slope, the greater the thermal effects on the fire, which translates into hotter fire and longer flame-lengths, thus higher risk.
3. **WIND EXPOSURE.** Exposure was chosen because wind often has the greatest effect on how a given fire burns. The more wind that can reach the base of flames, the hotter the fire and the longer the flame-lengths. Standard estimates used by fire behavior specialists were used to evaluate each situation. Wind exposure is a combination of a sites position on the topography and the height and density of vegetation on the windward side.

4. **FUEL MODEL.** The depth and arrangement of the fuel bed, as expressed by a Fuel Model, has a tremendous effect on expected fire behavior. We used the standard 13 fuel models fire behavior specialists use to predict fire behavior. Each fuel model will yield a different flame length under standard weather/fuel conditions. Flame length is a good estimator of the expected intensity of a fire, and can be used to predict the effects a given fire will have on the area being burned. Fuel models were ranked low to high based on the flame length that is produced under standard conditions. Short flame lengths yield low risk, long flame lengths yield high risk.

5. **LADDER.** The capability of fuels to act as a ladder, carrying fire from ground fuels up into the crowns of standing timber, was chosen as a factor, because the most dangerous fire is a crown fire. The closer ladder fuels are to ground fuels and the more continuous they are into the crowns, the higher the risks to nearby property.

6. **BUILDING EXPOSURE.** Nearness of wildland fuels to a building is an important factor. The closer these fuels are to the building, the more likely that fire burning in the fuels can spread to the building. Fire can spread to the building either by direct exposure to flames, by continued exposure to the radiant heat of the flames from some distance, or by exposure to a wave of sparks given off by the fire. The closer the burning vegetation is to a building, the higher the probability that the building will catch fire.

For each of these six factors, three ranges of conditions were established to show low, moderate or high risk when a fire occurs within one of these ranges. The ranges for each factor are shown in Example 1.

EXAMPLE 1. FIELD RISK ASSESSMENT FORM

POINT IDENTIFICATION _____		RISK ASSESSMENT FORM	
ROAD NUMBER	_____	MP	_____
<u>RISK</u>			
<u>FACTOR</u>	<u>LOW</u>	<u>MODERATE</u>	<u>HIGH</u>
Aspect	N, NE	NW, E, SE	F, W, SW, S
Slope	<20%	20-40%	>40%
Wind exposure	Full shelter	Partial shelter	Exposed
Fuel Model	8, 9	1, 5, 11	2, 3, 6, 10, 12, 13
Ladder (ht to crown)	>30'	10-30'	<10'
Bldg exposure (dist to veg)	>50'	25-50'	<25'
<u>TOTALS</u>	<u>L</u>	<u>M</u>	<u>H</u>

MITIGATION: None Pile Prune Thin Chip Fuelbreak Sh Mow

On a field form, the existing conditions at each viewed property were circled for each factor. This then documented the field assessment for that building. The total number of low, moderate and high risk factors circled was noted at the bottom of the form. At each viewpoint, the types of mitigation work that would be effective on those specific conditions was noted to help get a feel for the types and total volume of work that would be necessary to do fuel mitigation work on an area or county wide basis.

This sampling technique has some limitations, but the team felt that the process would yield valuable information to help establish priorities for mitigation work. Limitations of the technique include: Only visible habitations were evaluated. Often only one limited view of the property was available. Estimates of the closeness of vegetation to the buildings were sometimes difficult to make accurately. Some of these limitations are compensating from one property to another, with one being higher risk than evaluated and another being lower. Since fuel mitigation work would occur after the team was invited on the property for a thorough evaluation of the situation, these limitations would not affect the ability for a landowner to have work done to “fire safe” the building.

MITIGATION WORK DEFINITIONS

A number of types of work that might be chosen to mitigate fire risk are listed on the form. The team had specific types of activities in mind for the work listed. These types of work were chosen because they are known to be effective in reducing expected fire behavior by modifying the depth of fuels and their arrangement in relation to other fuels.

To be clear for reader/users of this report, the type of work we will use to mitigate fuels risk defined. Some of the terminology used might imply different work to those who might use a different definition. Terms used on the form include: None, Pile, Prune, Thin, Chip, Fuelbreak, Sh, Mow.

None. The assessment observer saw no need to treat vegetative fuels around the building to reduce risk to wild fire.

Pile. Natural dead and down fuels present a risk to the building. Piling and burning could reduce this risk.

Prune. Remove live and dead branches from the lower boles of trees to reduce the potential of a ground fire being carried into the upper crowns of a timber stand. This work would most often be done to conifer saplings and pole sized trees. Near buildings, large conifer trees would also be pruned.

Thin. Cut selected conifer trees to break the continuity of crowns in a timber stand. Most often thinning will remove sapling and pole timber sized trees from the stands near buildings. This thinning work will reduce the potential for fire to be laddered into the upper canopy of the stand. Also, this will tend to keep the fire lower to the ground, with shorter flame lengths, and less damage potential. Occasional trees in excess of 10 inches DBH may need to be cut to open the canopy near a building and consequently reduce the risk of fire being carried to the building by a crown fire.

Chip. Fuel loading on the site would be reduced by use of a wood chipper. Chips may be broadcast back onto the site, or used for hog fuel.

Fuelbreak. To create a sizeable area of reduced fuel loading for an extended distance, which will provide a break between a zone of dense fuels and a group of structures.

Sh. Intended to denote removal of shrubs. This notation was not used in the assessment. See Mow for work that deals with shrubs.

Mow. To reduce fuel loading by removing shrubs or brush near a structure using some mechanical means. Chain saws or brush cutters would normally be the tools used. Removal of shrubs and brush will reduce the amount of fuels capable of being a ladder into the upper crown for fire.

RESULTS OF THE FIELD ASSESSMENT

RURAL SITUATION

During the field assessment, it became obvious that three factors were most influential in evaluating a particular property's exposure to risk from fire. Those factors were all related to forest fuels and their relationship to the building being observed. To begin with the fuel model that is around a building is perhaps most important. Second is how close to the building are the forest fuels. And third, if low and dense ladder fuels are close to the building, probability that the building will not survive a nearby fire is greatly increased. The other factors, aspect, slope and wind exposure, although important, do not seem to carry the same weight in evaluating risk as do the factors that involve the fuels.

To establish a property's relative risk in the event of a nearby forest fire, the following criteria were used for the designation High Risk:

A fuel model that is moderate/high risk; with ladder fuels less than 10 feet; and with building exposure less than 25 feet.

OR

A fuel model that is high risk; with ladder fuels less than 10 feet; with building exposure 25-50 feet; and with at least one other risk factor in the high category.

Using these criteria, 744 of the 1085 buildings evaluated (69%) are rated at High Risk. Those rated at Moderate Risk totaled 14 %. Low Risk properties totaled about 17 %.

The map prepared during the field assessment (See Appendix) indicates that high risk situations exist in virtually all portions of the county where human habitation exists. The proportions of high risk properties are relatively evenly spread wherever homes are located.

These results indicate that there is a definite need for forest fuel treatments around a high proportion of homes in Boundary County. The recommended fuel treatments will create three distinct benefits.

First, the treatments will create a defensible space around the buildings. This space would provide a safe place for crews to work while providing structure protection from an oncoming wild fire.

Second, the treatments will create a survivable space. This space will improve the chances that an undefended building and any occupants would survive an oncoming wildfire.

The third benefit is that this space will help fire fighters prevent a house fire from spreading into the forest, where a fire would threaten forest resources or other nearby buildings.

The summary for types of work that could reduce the risks of building exposures to fire indicates that three types of work are most prominent. Pruning was tallied as a needed treatment 591 times. Thinning was tallied 504 time. Mowing was tallied 243 times. Piling was only noted as a need three times, fuelbreaks as a need three times and chipping as a need was tallied 11 times. A combination of two or three of these treatments was frequently tallied for a given building.

CITY OF BONNERS FERRY SITUATION

There are forest fuels on the periphery, and within the residential areas of Bonners Ferry. In the assessment of wildland fire risk for the city of Bonners Ferry a slightly different approach was used for evaluation than that used in rural Boundary County. The assessment was made on an area basis, rather than on an individual home situation. The same Risk Assessment Form was used, and results were applied to the entire area that had similar conditions.

For that portion of Bonners Ferry south of the Kootenai River, about 60% of the periphery or forested inclusions in residential areas are rated to cause high risk to homes nearby. For that portion of the city north of the Kootenai River, about 34% of the forested periphery or inclusions in residential areas pose high risk to nearby homes.

Thus, our assessment indicates that there is a strong need for treatments of forest fuels in and around the City of Bonners Ferry, in order to reduce the risk of loss of life or valuable property, if a fire occurs in these fuels.

The fuels around the city are more uniform than those in the rural county situation. Only two types of fuel treatment work were tallied in the city situation, pruning and mowing

IGNITION CORRIDORS. In the assessment, a number of corridors where ignition of wildland fuels is likely, were noted.

Two major highways traverse the county. US Highway 95 courses the entire county, south to north. US Highway 2 goes from Three Mile junction to the Montana border. Potential ignitions along these routes include careless smokers and vehicle accidents that might start a fire.

Two major railroads also traverse the county. The Burlington Northern/Santa Fe line enters the county near MacArthur lake follows Deep Creek and exits at the Montana border along the Kootenai River. The Spokane International line enters the county near MacArthur lake and exits at Eastport, following Deep Creek, the Kootenai River and the Moyie River. Possible ignitions include those from hot carbon particles in the diesel exhaust, sparks from wheels hitting track joints, and from derailment accidents.

A Bonneville Power System electric transmission line comes into the county from the Montana line, follows the Kootenai River, then follows Deep Creek south to the county line. Other primary electrical distribution lines extend out from Bonners Ferry to all parts of the urban interface in the county. Major wind events causing live power lines to fall is the primary concern for ignitions. These wind events are often associated with dry cold fronts which hit the county in early to late fall, a time when forest fuels are most easily ignited.

For the most part, all of these ignition corridors are near the zones where the most dense grouping of high risk residences exists.

PUBLIC INVOLVEMENT AND EDUCATION

As the field assessment phase was occurring, the IFM team was meeting with the various fire departments in Boundary County, the many agencies that have fire protection obligations in the county, agencies that have access to grant funds and the public in general. The purpose of the meetings was to be sure that the various cooperators were aware of our process, and that the public was aware that funds were likely to be available to reduce risk of fire damage to their property.

News articles were encouraged prior to the major public meeting, in hopes that a broad spectrum of home owners in the county would attend and become aware of the county plans. Plans were laid to have a “Fire-Safe” presence at the Boundary County Fair, in order to answer questions and to extend public awareness of this project.

A total of 5 meetings were held. Four of the meetings were primarily with fire departments and interested or cooperating agencies. One meeting was held primarily for the general public. Attendees at each meeting were asked to sign in. Most did sign in, although a few did not.

The meeting format was structured to assure that all attendees were aware of the background nationally, and within the state of Idaho, that has driven the issue of wildland/urban interface fire risk. The relationship of this work Boundary County’s Fire Mitigation Plan to the National Fire Plan was explained.

The process being used by the IFM team was explained, so that those in attendance would gain some knowledge of important factors we were considering. The expected way that fuel-treatment for mitigation of fire risk would be conducted was discussed. Picture examples of fuel mitigation work in Kootenai County were shown.

We always asked for leads to persons who might want to do contractual fuel treatment work. We also sought advice as to how to increase public awareness that the project was underway.

The initial meeting was held April 21, 2003 at the City of Bonners Ferry fire hall. The city fire department and interested agency personnel were invited. This meeting was attended by:

- 5 employees of the Bonners Ferry Ranger District, USFS
- 2 members of the Bonners Ferry Fire Department
- 2 employees of Idaho Department of Lands
- 1 employee of the City of Bonners Ferry
- 1 from Boundary County Emergency Services
- 4 representatives of IFM.

On April 29, 2003 a meeting was held with North Bench and Hall Mountain volunteer fire departments, at the 3-mile fire hall. Attendees included:

- 4 members of North Bench VFD
- 1 from BLM
- 1 from IDL
- 1 from USFS
- 1 from Boundary County Emergency Services
- 1 resident
- 3 from the IFM team.

On May 1, the team met with the Naples VFD and Paradise Valley VFD at the Paradise Valley Cow Creek Station. In attendance were:

- 2 members of Naples VFD
- 3 members of Paradise Valley VFD
- 1 from USFS
- 1 from IDL
- 1 from LP Corp
- 1 from Boundary County Emergency Services
- 3 from IFM

On May 5, 2003 a meeting with Moyie Springs and Curley Creek VFD's was held at the Moyie Springs City Hall. In attendance were:

- 1 member of Hall Mtn. VFD
- 8 members of Moyie VFD
- 4 members of Curley Cr. VFD
- 1 from City of Bonners Ferry
- 1 from Boundary County Emergency Services
- 1 from BLM
- 1 from USFWS
- 3 from IFM

A public meeting was held on June 25, 2003 at the City of Bonners Ferry fire hall. There were 24 people in attendance, including some agency people and many individual homeowners. The field assessment and results of that assessment were displayed to the group.

Pictures of before/after fuel treatment operations in Kootenai County were shown to illustrate the types of work that is anticipated in Boundary County.

In addition this group was invited to share names of potential fuel mitigation contractors. They were invited to sign up if they were interested in having their homes evaluated for fire risk.

MITIGATION PLAN (Phase 2)

From information gathered in the Assessment Phase, the RFP directed that a plan be prepared. The plan was required to identify the kinds of work in forest fuels that are needed to reduce the risk of wildfire to the urban interface of Boundary County. Included in the plan are to be the establishment of priorities for accomplishing the work, and direction that will be followed in the implementation phase of this project (phase 3).

PRIORITIES FOR FUEL TREATMENT WORK

When the IFM team prepared the RFP for the County, it was envisioned that priorities would be in zones, that could be displayed on a map. During the field assessment, it became apparent that there is an extremely high proportion of homes in the county at high risk in the event of wildfire. These homes are fairly evenly distributed along the roads and other ignition corridors throughout the county. It was decided that priorities for treatment could best be established by definition rather than by mapped zone. The team determined that the priorities for treatment would be in the order as presented in Table One.

TABLE ONE. Priority fuel treatments by rank.

<u>Priority</u>	<u>Description</u>
#1	Demonstration projects. (Funded).
#2	Treat periphery and wildland inclusions of City of Bonners Ferry.
#3	Treat fuels around resident schools. (If schools are willing)
#4	Treat fuels around rural homes rated High Risk where owners are willing. (Includes residences in Naples and Moyie Springs).
#5	Treat fuels around homes rated as moderate risk if and when funds are available.

DESCRIPTION OF WORK BY PRIORITY

DEMONSTRATION PROJECT. There is a need for a demonstration project. This project will treat High Risk fuels in fairly visible portions of the county. The work would reduce fire risk for the properties treated, while providing examples of the work needed throughout the county, for residents to view. It is anticipated that these demonstration projects will generate the needed public awareness to get the “Fire Safe” program rolling in Boundary County. We base this conclusion on how this type program has grown in other communities, once the treatment work becomes visible to the public.

Areas selected for demonstration projects are:

1. Grandview City Park located between the Burlington Northern right-of-way and homes along the south bench of Bonners Ferry.
2. Groups of residences in the Naples/Paradise Valley; Three Mile/Moyie and Mount Hall areas of the county, to provide neighborhood accessibility to view project type work.

PERIPHERY AND WILDLAND INCLUSIONS, CITY OF BONNERS FERRY. Much of the periphery of Bonners Ferry is forest vegetation that is rated as high risk to nearby buildings if this vegetation catches fire. In addition, there are a number of inclusions of this type vegetation within the city limits that also rates high risk. Treatment of the fuels in these areas will be the second priority.

Areas that were rated as high risk include:

1. Northern city limits boundary from Marx addition to US Highway 95.
2. North bank Kootenai River from city limits east to S&I Railway.
3. West boundary of city, above BN ROW south of Grandview Park to USFS.
4. South of Ash St from by-pass to east city limits.
5. East of Cemetery Rd from Nevada St. to Wisconsin St.
6. West of Alder and Sawyer from Louisiana south to southernmost home.
7. East perimeter of city from water treatment plant to Paradise Valley Road.
8. East of Tamarak Lane, south from US 95 to southern city limit.
9. West of Golden St between Locust and Washington St, above Highway.

RESIDENT SCHOOLS. There are several schools in the county where students live on campus in dorms. The buildings for these schools are of wooden construction. All of the campuses are located in forested settings. All of the sites rated high risk in the event of a fire. The third priority for fuel treatment will be the resident school sites.

RURAL RESIDENCES RATED AT HIGH RISK. According to our assessment, somewhere between 50% and 70% of the rural homes in Boundary County rate at high risk to damage from wild fire. An analysis of fire occurrence maps compiled by Idaho Department of Lands was done. These maps indicate that fires occur throughout the wildland/urban interface, but a higher proportion occur in areas of denser populations. Homes at high risk are scattered throughout the wildland /urban interface, but a higher proportion also tend to be located in areas of denser population.

Therefore, the fourth priority for fuel treatment to reduce the risk of damage to property from wildland fire will be to treat as many high risk residences in the county as seek assistance or as grant funds allow.

RURAL RESIDENCES RATED AT MODERATE RISK. Approximately 15 percent of homes in Boundary County rated moderate risk to damage in the event of fire. Most of these homes were rated at this level because they had 25 to 50 feet of clearance between the forest vegetation and the building. This clearance is lower risk than the less than 25 feet that made homes high risk. But under conditions of high fire danger, these homes can be endangered by fire, because this amount of clearance does not really allow for a defensible space. When most property that is high risk has been treated, it is prudent to begin doing fire safe work on the next level of risk.

Therefore, the fifth priority for fuel treatment will be those homes of willing owners where the fire risk rating was moderate.

PLAN IMPLEMENTATION

FUNDING THE PLAN

The plan for accomplishing fuel treatments to mitigate fire risk in Boundary County will be in two parts. The first part will be making grant requests seeking funds to complete needed work. The second part will be assigning work and accomplishing the fuel treatments as described in the plan upon receipt of funds.

During the Assessment Phase, the IFM team identified a large volume of much needed work throughout the urban interface in Boundary County to reduce fire risk. Based on the priorities established in this mitigation plan, the IFM team will continue to seek grants to accomplish the identified needed work.

As the grant funds become available, the IFM Project Manager will begin identifying willing land owners whose properties are within the priority definitions and determining the method by which fuel treatment work will be accomplished.

At this point, estimating the total funds needed to do all priority work is a pretty rough process. Because the fuel modification work will be done only on properties that volunteer to be a part of the program, total properties to treat is only an estimate. For an initial estimate, the team chooses to use these figures:

Estimated home properties—1200. Cost per property--\$1500 to 2000. Needs--\$1,800,000 to \$2,400,000.

Estimated City perimeter—100 acres. Cost per acre--\$1000 to \$1300. Needs--\$100,000 to \$130,000.

Total estimated needs--\$1,900,000 to \$2,530,000.

After one season of work, the team will have a much firmer estimate of the number of home owners who will participate, and the average costs to modify fuels around a home. This information will be used to adjust grant seeking strategies if needed.

MITIGATION WORK

The goal of this plan is to create a defensible space (safe area for fire fighters) and survivable space (sufficient reduction in fire behavior to help the building survive) around any building that is selected for fuel mitigation work. To create a defensible/survivable space, natural forest fuels will be modified to reduce the intensity of fire that would occur if they were to burn. Fuel modification will occur at least up to 100 feet from the perimeter of the building (if property boundaries allow). It will involve the following general kinds of work activities:

1. Remove most shrubs and conifer saplings and pole timber within 30 feet of building.
2. Thin conifer saplings and pole timber to the perimeter boundary so that their crowns are not touching and have room to grow without again becoming interlocking.
3. Prune all trees to the perimeter boundary to one half live crown or to the point that remaining foliage is at least 10 feet off the ground.

4. Prune tall conifers within 15 feet of building to the point that no foliage is below eave line.
5. Mow most shrubs and brush to the perimeter boundary.
6. Thin trees whose crowns are in the main canopy so that the canopy is not continuous and incapable of sustaining a crown fire.
7. Pile for burning, or chip and spread residues from the thinning, mowing and pruning.

Additional work will be prescribed in situations where certain fuel models and conditions exist around the building due to the nature of fire that would occur in periods of high fire danger.

To develop the best prescriptions for defining defensible/survivable space, research was done to determine the boundaries of extreme fire weather that can be expected in Boundary County. Weather records from the weather station at the Bonners Ferry Ranger Station were analyzed. Weather has been recorded daily at this station for many years. A summary was available for the period of 1960 through 2001. We chose to analyze the months of August and September, the period of the highest fire danger in a typical year.

To define the needed zone for defensible space standard fire behavior modeling was done for the most aggressive fuel models in the county. This modeling used two primary factors from the weather records, wind speed and 10 hour fuel moisture.

A 20 foot wind speed of 18mph was selected. This wind speed is near the 97th percentile maximum winds for the period of record for all days in August and September. The selected wind speed is well below those of known events during wild fires. In particular, winds during Firestorm '91 and during the 1985 Swimming Pool Fire were much greater. The selected 20 foot wind (18mph) was reduced to effective wind speed for various slopes using standard fire behavior methodology.

A 10 hour fuel moisture of 3% (97th percentile low for all days) was used in the modeling process.

For fuel models that have a live fuel component, the standard “cured state” live fuel moisture of 50% was used for predictions since the cured stage is usually reached by mid-august in Boundary County.

From these factors, flame length, rate of spread and fire line intensity were calculated for the selected fuel models for several terrain slope classes. This information was used to define the “Safe” defensible/survivable space that should be prescribed for buildings facing those conditions. This information will be helpful to the Project Manager in determining the amount of work needed near any building under consideration. It will help him tailor the prescription to fit the need in critical fuel conditions. It will help to avoid the “one size fits all” prescription that may prove inadequate in severe burning conditions.

The following table shows recommended conditions to exceed the “standard” and to what distance treatment should extend under those conditions.

TABLE 2. FIRE BEHAVIOR OUTPUTS AND RECOMMENDED TREATMENT DISTANCES

F M	SLOPE	EXP	F. L.	R.O.S	F. I.	DISTANCE
2	20	all	9	60	600	150 ft
3	20	all	21	240	3900	200 ft
3	40	all	22	275	4000	200 ft
3	60	all	24	320	5500	200 ft
5	20	exp	11	75	1000	200 ft
5	20	part	9	48	700	150 ft
5	40	exp	11	82	1250	200 ft
5	40	part	9	50	800	150 ft
5	60	exp	13	100	1400	200 ft
5	60	part	10	65	900	200 ft
6	20	exp	9	80	900	150 ft
6	40	exp	10	85	1000	200 ft
6	40	part	9	65	600	150 ft
6	60	exp	11	98	1100	200 ft
6	60	part	10	65	700	200 ft
10	60	exp	11	35	1000	200ft
10	60	part	9	32	700	150 ft

Where FM is Fuel Model; Slope is in percent; EXP is wind exposure of exposed, partial or full; F L is Flame Length in feet; ROS is Rate of Spread in chains per hour; FI is Fire line intensity in BTU/second/square foot; and DISTANCE is the outer perimeter of work from a building for that field condition.

In addition to extending fuel modification due to anticipated fire behavior, under some circumstances, the Project Manager may identify additional work. In looking at various homes in the county, the team has noticed that occasionally there are natural or man made barriers to fire that are logical to tie into to anchor fuel modification work. Some examples include roads, riparian zones or ridge-tops that are just beyond the standard perimeter as defined in this report. In accordance with accepted fire fighting safety dogma, to anchor the line of defense, the team has decided to allow the Project Manager to make the decision to extend modification work to an anchor point where appropriate.

ON-GOING WORK TOWARD PLAN IMPLEMENTATION

As this document was being created, work has been in progress to begin implementation of planned activities as funds become available. Much of this work has been organizational in nature.

Requests for bids were published to generate a list of contractors willing to do fuel treatment work generated by this plan.

Much research was done to identify potential qualifying grant opportunities, to assure that funds would be available to do the work.

Money was identified to accomplish the Demonstration Projects. Sites and willing homeowners have been sought, in order that effective work can be done and demonstrated by this part of the over-all project.

IFM has worked with the county to help establish a Geographical Information System (GIS). The fuel modification work that will be accomplished under this plan will be mapped into GIS. As various layers of information are built into this system, all agencies that deal with emergencies will benefit and be able to work more efficiently. Retrieval of important information will occur at a more rapid rate and be more accurate and useful.

IFM has developed forms that will be passed on to all home owner contacts. These forms include the Home Owner Checklist, and Home Assessment. These forms are in the appendix.

IFM is and will be coordinating with various agencies in Boundary County with wildlands adjoining properties with residences. This coordination will encourage projects on agency lands to modify the forest fuels in ways that will reduce fire behavior in the event of a fire on those lands. Agencies that are being or will be contacted include the:

- USFS, with many miles of shared boundaries with private property.

- BLM, with scattered parcels of land in the Kootenai valley.

- IDL, whose boundaries are often shared with private landowners.

- Idaho Department of Transportation, with forested lands adjoining Moyie Springs.

- USFWS, with land in the Kootenai Valley.

- Idaho Fish and Game, with several parcels dedicated to wildlife management.

RELATED ISSUES, OUTSIDE THIS IFM CONTRACT

ACCESS. During the field assessment, the team noted severe access problems throughout the county and within much of the City of Bonners Ferry. Many roads in the county and streets in the city get very narrow near their terminus. They often turn into narrow, steep private lanes and drives. In many cases large fire fighting equipment would have problems negotiating the road, especially if conditions were smoky and particularly if excited residents were attempting to evacuate. A high proportion of the county roads and city streets provide only one route of entrance/egress. Adequate turn arounds to accommodate fire trucks often do not exist. It would be prudent for both the county and the city to develop a long-term strategy for investment in fire fighting/emergency evacuation access. Evacuation access is a concern for a variety of disaster situations beside forest fires.

PREPAREDNESS. The National Fire Plan is the umbrella under which this plan and other wildland fire issues is being addressed and funded. A part of the National Plan is the upgrading of fire fighting agencies and organizations through out the country. This concept is referred to as preparedness. A well prepared organization is well equipped, well trained and well staffed to meet most situations. If a major amount of wildland fuel modification work is accomplished, the work can be doubly effective if all the fire organizations in the county are well prepared. It will be important for the County Commissioners to continue monitoring the progress of these organizations in upgrading equipment and training.

MAP COORDINATION. In our preparation of this plan we found several indications of needed coordination of mapping efforts in the county. Various county departments seem to use their own maps while other departments do not seem to be aware of these maps.

An example of how problems could arise is noted on the map we got for the city of Moyie Springs. On this map, several county roads have numbers that differ from those on the county road and bridge map, which was used as our base for field assessment. In rapidly evolving emergencies, such discrepancies can cause dangerous delays in use of equipment or initiating evacuations. Not all emergencies are handled by “locals,” who know the area well and do not need maps.

It is hoped that the creation of a GIS mapping system for the county will negate this concern.

MAINTENANCE. It is important for all who work with this plan to be aware of the urgent need for maintenance activities to continue after the initial fuel mitigation work is completed.

One characteristic of most of the fuel types in Boundary County is that they will aggressively begin to recreate ladder fuels. Much of the land in the county has adequate soil depths and receives enough annual moisture to support re-growth of brush species and re-initiation of conifer seedlings after work is completed.

Follow-up work will be relatively easy in the first year after initial treatment, and become increasingly more difficult in later years. In some habitat types, if follow-up work isn't accomplished by the third or fourth year, fuel conditions are likely to have returned to pre-treatment danger levels.



Boundary County Fire Safe Program Contract Addendum



Fire Safe Project Order # _____

Contractor Name: _____ Contact: _____

Contractor Address: _____ Phone: _____

Notify Owner before working: yes____ / pets____ Other Phone: _____

By reference this Project Order is made part of the contract between the Boundary County Board of Commissioners and the above named Contractor.

Job Name: _____ Phone # _____

Job Address/Location: _____

Instructions: Do project work per the **CONTRACTUAL INSTRUCTIONS** found in the attached Defensible Space Plan. Special Instructions:

Total amount to be paid to Contractor: _____

Holdback (if applicable): _____

Contractor Signature: _____ Date: _____

Project Manger Signature: _____ Date: _____

Completion Inspection Date: _____ Completion Approved By: _____
(print name)

(signature)

Make invoice to Boundary County Fire Safe and send it to the Fire Safe Program Manager:

Ken Nielson
C/O Inland Forest Management
P. O. Box 1966
Sandpoint, Idaho 83864



DEFENSIBLE SPACE PLAN



Boundary County Fire Safe

PROJECT NAME: _____

PROJECT NUMBER: _____

Boundary Fire Safe is a program of the Boundary County Board of Commissioners. Funded in part by the Bureau of Land Management, and Idaho Department of Lands through grants from the USDA Forest Service. The U. S. Department of Agriculture Forest Service prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, and marital or family status (not all prohibited bases apply to all programs). To file a complaint of discrimination write: USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Ave. SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice or TDD). USDA Forest Service is an equal opportunity provider and employer.

Name: _____ Phone: _____

Address: _____ Fire District/Dept: _____

Physical Address/Location: _____ # of acres: _____ # of structures: _____

Plan Completed by: _____ Lat./Long: _____

Fuel Type: mostly – Brush ____ Trees ____ Combo ____ Hazardous Fuels Risk Assessment: High ____ Moderate ____ Low ____

Fuels Treatment: Mostly by – Hand ____ Machine ____ Combo ____ Fuel Disposal: Mostly by – Burn ____ Chip ____ Haul ____
Leave ____ Combo ____

Recommendations to the

Homeowner: If item is marked see notes below.

access ____ / decks and flammable material ____ / roofs & gutters
LPG ____

Contractual Instructions

Boundary is designated by orange flagging _____. Treat all brush taller than 2 feet. Cut all conifer trees less than 5" dbh unless marked in blue – sample or totally marked. Cut conifers larger than 5" dbh that are marked in white – sample or totally marked. Prune remaining trees up to 10' or 1/3 of their total height, whichever is less. Treat the slash created which is less than 3" in diameter as follows:

This Work is tentatively scheduled to be done in the month of _____ 200_____

This plan and the above work described under Contractual Instructions is funded in part by National Fire Plan grant dollars and subject to the rules and regulations thereof. The work described herein will be completed at no cost to the homeowner. Other recommendations would be done at the owners discretion and expense. Persons doing this work must comply with the stream protection requirements of the Idaho Forest Practice Act, which states in part: "No ground based equipment such as excavators, bobcats, tractors, skidders etc. shall be operated in the stream protection zone. A stream is "a natural watercourse of perceptible extent with definite beds and banks which confines and conduct continuously or intermittently flowing water." Stream protection zones are 75 feet for a class I stream and 30 feet for class II streams on each side of the stream channel as measured from the ordinary high water mark. Any questions regarding the status of a stream should be referred to the local Idaho Department of Lands Forest Practice Advisor.

Landowner is doing the work: I am responsible for conducting the work as described above. Additionally, I will make every reasonable effort to maintain the fuel modification for a minimum of 10 years or until I sell this property, whichever is sooner. I understand I am responsible for taxes owed on personal gain from this income. **The amount to be paid the landowner for this project is: \$ _____**

Contractor is used: I hereby authorize the above work to be accomplished on my property and allow the contractors to enter onto my property for the purpose of conducting said work. I am responsible for providing the correct boundary information regarding my property. Additionally, I will make every reasonable effort to maintain the fuel modification for a minimum of 10 years or until I sell this property, whichever is sooner.

Landowner signature: _____

Date: _____

Fire Safe: _____

Date: _____

Boundary County Fire Safe and the Boundary County Board of Commissioners do not make any express or implied warranties, including but not limited to any implied warranties of merchantability, or fitness for a particular purpose. It is hereby understood that Boundary County/Boundary County Fire Safe is not an agent, employer, master, servant or principle of landowner and/or contractor and that landowner and/or contractor agrees to hold Boundary County/Boundary County Fire Safe harmless from all liability or expense on account of claims, suits, and cost connected with landowner and/or contractors negligence or wrongful acts arising from this agreement. **This contract may be cancelled by either party within 72 hours written notice.**

Work Complete: Date: _____

_____ Fire Safe representative



Boundary County Fire Safe Home Assessment

The purpose of this assessment is to provide the landowner a list of **defensible space recommendations** that will help protect their home in case of a wildfire.

Evaluator: _____ Assessment Date: _____

Name of Property owner: _____

Address: _____

City/State/zip: _____

Phone Number: _____ Parcel Number: _____

Physical Location of Assessment (if different from above): _____

Assessment

I. Access

A. Is the home clearly identified with an address? Yes___ No___

B. Is the driveway at least 12 feet wide? Yes___ No___

C. Is there at least 45' at the end of the driveway for a truck turn around ? Yes___No___

D. Is the drive way over grown with brush and/or tree branches? Yes___ No___

Additional Comments (Access):

II. Yard and Structures

- A. Is the roof constructed of fire retardant material? Yes___ No___
- B. Is there an accumulation of leaves/needles on the roof or in rain gutters? Yes___ No___
- C. Are there open soffets/eaves on the house? Yes___ No___
- D. Is there a screen on the chimney with a 1/2" minimum mesh? Yes___ No___ N/A___
- E. Are there tree branches within 10' of the chimney opening? Yes___ No___
- F. Is there a wooden deck? Yes___ No___
- G. Is there wood stacked against a structure or under a deck? Yes___ No___
Wood should be stacked at least 30' from any structure and have 10' of clearance.
- H. Is there an LPG tank, if so is it at least 30' from any structure? Yes___ No___ N/A___

Additional Comments Yard and Structures:

III. Landscape

- A. Are any structures exposed to flammable vegetation? Yes___ No___
___Distance to vegetation <25'
___Distance to vegetation 25'-50'
___Distance to vegetation >50'

B. Are there ladder fuels present? Yes___ No___

Exposure to Flammable Vegetation	<25'	25'-50'	>50'
Height to crown <10'	_____	_____	_____
Height to crown 10'-30'	_____	_____	_____
Height to crown >30'	_____	_____	_____

C. Are there trees/branches intermingled with power lines? Yes___ No___

Additional Comments Landscape:

IV. Recommendations
